NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

SEDIMENT BASIN

(No.)
CODE 350

DEFINITION

A basin constructed to collect and store debris or sediment.

SCOPE

This standard applies to the installation of all basins where the primary purpose is to trap and store waterborne sediment and debris.

PURPOSE

To preserve the capacity of reservoirs, ditches, canals, diversion, waterways, and streams; to prevent undesirable deposition on bottom lands and developed areas; to trap sediment originating from construction sites; and to reduce or abate pollution by providing basins for deposition and storage of silt, sand, gravel, stone, agricultural wastes, and other detritus.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where physical conditions or land ownership preclude treatment of a sediment source by the installation of erosion-control measures to keep soil and other material in place or where a sediment basin offers the most practical solution to the problem.

CRITERIA

General

The design of dams, spillways, and drainage facilities shall be according to NRCS standards for ponds (378) and grade stabilization structures (410) or according to the requirements in TR-60, as appropriate for the class and kind of structure being considered.

For basins constructed of concrete or other non-earthen material, designs will be based on criteria in appropriate ACI codes or ASTM guidelines.

The design and construction of sediment basins shall comply with all state and local laws, ordinances, rules, and regulations.

The sediment basin shall be located to obtain the maximum storage benefit from the terrain and for easy clean-out of trapped sediment or other detritus.

Earthen Basins

Size of Basin

The capacity of the sediment basin shall equal the volume of sediment expected to be trapped at the site during the planned useful life of the basin or the improvements it is designed to protect. If it is determined that periodic removal of sediment will be practicable, the capacity may be proportionately reduced. The capacity of the sediment basin, as measured to the elevation of the crest of the auxiliary spillway or principle spillway if there is no auxiliary spillway, shall be at least 67 cubic yards per acre of total drainage area or 0.5 watershed inches.

Temporary basins having drainage areas of 5 acres or less and a total embankment height of less than 4 feet may be designed with less conservative criteria if conditions warrant. The embankment shall have a minimum top width of 4 ft and side slopes of 2:1 or flatter. The length to width ratio shall be 2 to 1 or greater. An outlet shall be provided of earth, pipe, stone, or other devices adequate to keep the sediment in

the trap and to handle the 10-year-frequency discharge at the maximum design sediment elevation without failure or significant erosion.

Provisions shall be made for draining sediment pools if necessary for safety and vector control. Fencing and other safety measures shall be installed as necessary to protect the public from floodwater and soft sediment. Due consideration shall be given to good visual resource management.

Spillway Design

Runoff shall be computed by the methods outlined in: Chapter 2 of the Engineering Field Handbook, "Estimating Runoff", TR55, "Urban Hydrology for Small Watersheds", or other approved methods.

Runoff computations shall be based on the soil-cover conditions expected to prevail in the contributing drainage area during the anticipated effective life of the structure. The combined capacity of the principle and auxiliary spillway shall be sufficient to pass the peak rate of runoff from a 10-year frequency storm.

Principle Spillway

The principle spillway if used will be designed and installed according to criteria in NRCS Standard 378 - Ponds. The minimum capacity of the principle spillway shall be 0.2 cfs per acre of drainage area when the water surface is at the crest of the auxiliary spillway. The principle spillway shall have the capacity to handle the peak flow from a 10-year frequency storm event if no auxiliary spillway is provided. Provisions shall be provided to gradually draw down the water level to its permanent level after each storm event.

An outlet shall be provided including a means of conveying the discharge in an erosion-free manner to an existing stable stream or channel. Protection against scour at the discharge end shall be provided if needed.

Auxiliary Spillway

Auxiliary spillways shall not be constructed on fill. The auxiliary spillway cross section shall be trapezoidal with a minimum bottom width of eight feet. The minimum capacity shall be that required to pass the peak rate of runoff from a 10-year frequency storm event, less any reduction due to flow through the principle spillway.

When used the auxiliary spillway shall be designed according to criteria in NRCS Standard 378 - Ponds for velocity limitations, erosion protection alternatives, and freeboard requirements.

Embankment

Sediment basins with embankment heights greater than 4 feet shall be design and constructed according to NRCS Standard 378 - Ponds and state dam regulations.

Embankment heights less than 4 feet shall be constructed with a minimum top width of 4 feet and side slopes of 2 horizontal to 1 vertical or flatter. Fill material shall be suitable moist embankment soil material free of stones, roots, and vegetation. Compaction shall be obtained by routing construction equipment over the fill material to get wheel compression. The base area of the embankment shall be stripped of vegetation before construction begins.

Agricultural Waste Non-earthen Structures

Concrete and other similar type structures will be constructed on suitable foundation materials and meet the following storage and discharge design requirements as described in the Midwest Planning Service MWPS, Structure and Environment Handbook section for sediment basins:

1. The basin will be a minimum of 2 feet deep and a maximum of 4 feet deep and have a length to width ration of at least 2 to 1.
2. The outlet spillway will be designed for a minimum of 30 minutes detention time.
3. The minimum designed detention volume will be that necessary to store the runoff from the impervious area entering the basin caused by a 10 year - 1 hour peak rainfall event.
4. Provisions must be provided to remove accumulated sediment when 50% of available storage is filled such as a ramp or suction pumping.
5. The principal spillway may be a perforated pipe, weir with baffle, or other engineer approved outlet and provisions must be provided for draining the basin for cleaning.

CONSIDERATIONS

1. Consider the storage structure effects on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation, and groundwater recharge.

2. Consider the effects on downstream flows and aquifers that could affect other water uses and users.

3. Consider the effects on volume of discharge flow on the environmental, social, and economic conditions.

4. Consider the effects on the water table downstream and the results of changes of vegetative growth.

5. Consider the effects on erosion, movement of sediment, pathogens, and soluble and sediment-attached substances that could be carried by runoff.

6. Consider the effects on the visual quality of onsite and downstream water resources.

7. Consider the effects on wetlands and water-related wildlife habitats.

PLANS AND SPECIFICATIONS

Plans and specifications for installing sediment basins shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

An operation and maintenance (O&M) plan shall be prepared for the Sediment Basin and any associated components or practices.

The sediment basin shall be cleaned out when the volume is reduced by 50 percent. The elevation corresponding to the maximum allowable sediment level shall be determined and marked on the structure for visual determination.

Sediment removed from the structure shall be deposited on cropland or other appropriate land area.

The basin and associated components shall be inspected periodically and repaired as needed. All vegetated areas will be maintained to prevent erosion problems.

Livestock shall be restricted from access to the basin embankment, outlet channel, and pool area.